

# Optimizing the PMW constellation for all-weather diurnal land surface temperature

Completed Technology Project (2016 - 2019)



## Project Introduction

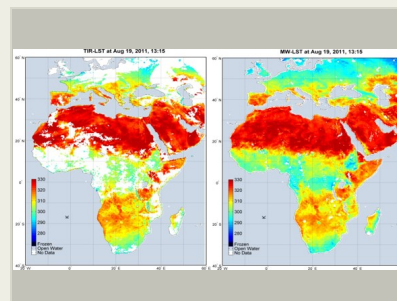
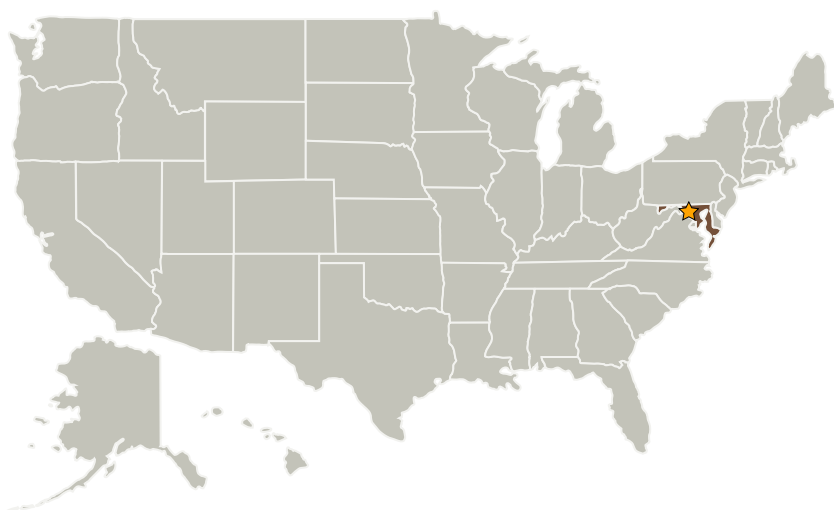
We aim to explore ways to improve the current and planned constellation of PMW satellites with a targeted instrument pair within the budget of an EV-mission. The objective is to identify a space mission that would allow us to provide a reliable stream of all-weather diurnal land surface temperature (DTC) information to the Earth system modeling and forecasting community. Engineering analysis will focus on the MMIC that allows high resolution microwave imaging capabilities.

Knowledge of ET at global scales is a critical component of global water balance studies. The need for global observations of ET with a high spatial and temporal resolution to address important questions related to water availability, crop productivity and their vulnerability to climate change was identified by the 2017 Decadal Survey for Earth science and applications from space (ESAS, 2017). This IRAD will specifically address questions related to the optimal orbit for a targeted microwave instrument to compliment a constellation of PMW satellites.

## Anticipated Benefits

The proposed technological and scientific analysis will allow us to hone in on low-cost mission solutions with an impact on evaporation retrieval from space.

## Primary U.S. Work Locations and Key Partners



Two-day composite of mid-day land surface temperature as measured by thermal infrared (left) and microwave (right). Microwaves can overcome gaps due to clouds (white areas in left-hand image).

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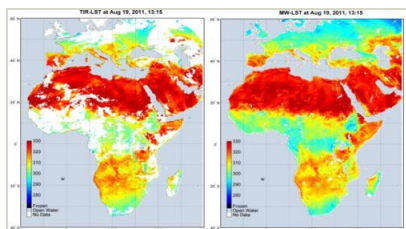


Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland

## Primary U.S. Work Locations

Maryland

## Images



### Coverage during cloudy skies.

Two-day composite of mid-day land surface temperature as measured by thermal infrared (left) and microwave (right). Microwaves can overcome gaps due to clouds (white areas in left-hand image). (<https://techport.nasa.gov/image/34324>)

### Project Website:

<http://sciences.gsfc.nasa.gov/sed/>

## Organizational Responsibility

### Responsible Mission Directorate:

Mission Support Directorate (MSD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Center Independent Research & Development: GSFC IRAD

## Project Management

### Program Manager:

Peter M Hughes

### Project Managers:

Matthew J McGill  
William E Cutlip

### Principal Investigator:

Thomas R Holmes

### Co-Investigators:

Negar Ehsan  
Peggy E O'Neill  
Jeffrey R Piepmeier

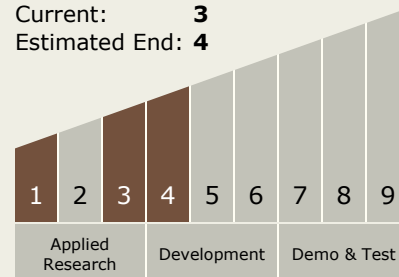
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## Technology Maturity (TRL)

Start: **1**  
Current: **3**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
    - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

## Target Destination

Earth

## Supported Mission Type

Projected Mission (Pull)